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PRO ET CON ANALYSIS OF OCCUPATIONAL EXPOSURE ASSESSEMENT TOOLS AND CONCEPTS FOR NANOMATERIALS

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There is an urgent need for simple and yet robust scientific methods to evaluate the potential of occupational exposure related to the production and application of nanomaterials. A number of alternatives to traditional exposure assessment have recently been explored and proposed for nanomaterials. Examples of these include the "Control Banding Nanotool" developed to assess and control the risks of nanomaterials, the more holistic "Swiss precautionary matrix", and the first order quantitative risk assessment tool, NanoSafer. Here we review these and other tools and we discuss various elements of the tools (input data requirements, exposure evaluation and handling to reduce exposure) as well as specific pros and cons. Most of the tools provide a transparent and comprehensible approach to assess occupational exposure, but the majority of them are based on purely qualitative considerations about occupational settings. A few methods include specific advice on risk management going well beyond what is normally considered in traditional exposure assessment. A disadvantage in most of the existing concepts is that their data requirements are fairly high. In some cases the technical and scientific procedures to determine them is inconclusive or non-existing. Some of the concepts are furthermore based on purely theoretical considerations and too time-consuming to apply in reality. We provide a set of recommendations for what regulators and risk assessors need to consider before selecting and applying one or the other tool in a given situation and call for further application and development of these tools in the support regulatory decision-making. The aim should be to develop a tiered approach with a purely qualitative, a semi-quantitative, and purely quantitative tool, respectively which can be employed depending on available data and user background. See figure 1 for an illustration of how this could be envisioned in regard to the on-going development of the Danish NanoSafer tool.

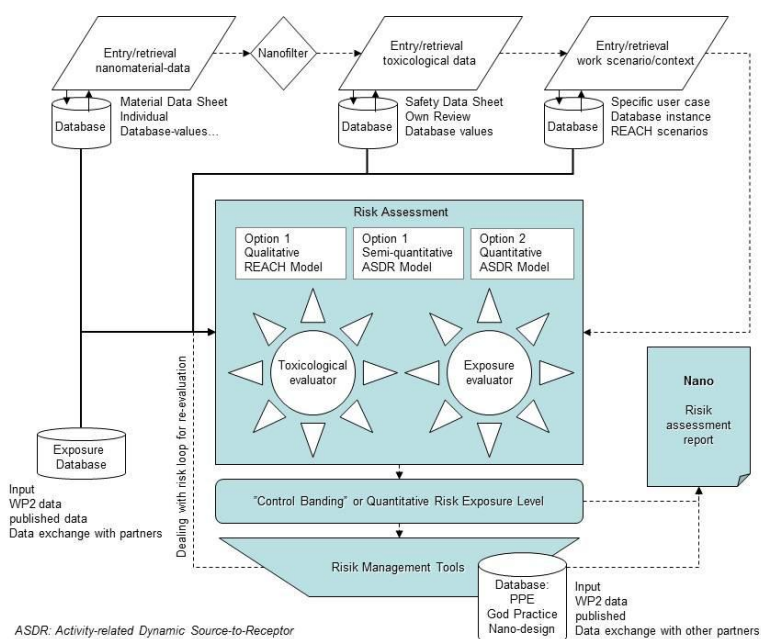


Figure 1 : Schematic Illustration of how one of the evaluated tools, i.e. NanoSafer could potentially incorporate various exposure assessment models e.g. a qualitative REACH model, a semi-quantitative ASDR model and a quantitative ASDR model termed option 1,2 and 3, respectively